

*This book is dedicated to the
memory of
Georges Matheron, who
gave the study of
morphology its initial
impetus.*

Contents

Dedication	v
Foreword	xi
Preface	xiii
Acknowledgments	xvii
Part I Morphological operators	
Binary Decision Diagrams as a New Paradigm for Morphological Machines <i>Junior Barrera and Ronaldo Fumio Hashimoto</i>	3
Image filtering using morphological amoebas <i>Romain Lerallut, Étienne Decencière and Fernand Meyer</i>	13
Numerical Residues <i>Serge Beucher</i>	23
Efficient path openings and closings <i>Ben Appleton and Hugues Talbot</i>	33
Structuring Elements following the Optical Flow <i>Nicolas Laveau and Christophe Bernard</i>	43
Recursive Interpolation Technique For Binary Images Based on Morphological Median Sets <i>Javier Vidal, Jose Crespo and Víctor Maojo</i>	53
Part II Connected filters and reconstruction	
Second-Order Connected Attribute Filters Using Max-Trees <i>Georgios K. Ouzounis and Michael H. F. Wilkinson</i>	65
Transformations with Reconstruction Criteria: Image Segmentation and Filtering <i>Iván R. Terol-Villalobos and Jorge D. Mendiola-Santibañez</i>	75
Attribute-Space Connected Filters <i>Michael H.F. Wilkinson</i>	85

Vector-attribute Filters <i>Erik R. Urbach, Niek J. Boersma and Michael H.F. Wilkinson</i>	95
Ruminations on Tarjan's Union-Find Algorithm and Connected Operators <i>Thierry Géraud</i>	105
Labelled Reconstruction of Binary Objects: A Vector Propagation Algorithm <i>Michael Buckley and Ryan Lagerstrom</i>	117
Grayscale Level Multiconnectivity <i>Ulisses Braga-Neto</i>	129
Shape-Tree Semilattices <i>Renato Keshet</i>	139
Part III Segmentation	
Morphological Segmentations of Colour Images <i>Jean Serra</i>	151
Fast Implementation of Waterfall based on Graphs <i>Beatriz Marcotegui and Serge Beucher</i>	177
Mosaics and Watersheds <i>Laurent Najman, Michel Couprie and Gilles Bertrand</i>	187
A new definition for the dynamics <i>Gilles Bertrand</i>	197
Watershed-driven region-based image retrieval <i>I. Pratikakis, I. Vanhamel, H. Sahli, B. Gatos and S. Perantonis</i>	207
Efficient implementation of the locally constrained watershed transform and seeded region growing <i>Richard Beare</i>	217
Part IV Geometry and topology	
Optimal shape and inclusion <i>Jean-Marc Chassery and David Coeurjolly</i>	229
Regular Metric: Definition and Characterization in the Discrete Plane <i>Gerald Jean Francis Banon</i>	249
Euclidean skeletons of 3D data sets in linear time by the integer medial axis transform <i>Wim H. Hesselink, Menno Visser and Jos B.T.M. Roerdink</i>	259

<i>Contents</i>	ix
Digitization of Non-regular Shapes <i>Peer Stelldinger</i>	269
Downsampling of binary images using adaptive crossing numbers <i>Etienne Decencière and Michel Bilodeau</i>	279
Grey-weighted, ultrametric and lexicographic distances <i>Fernand Meyer</i>	289
Mathematical modeling of the relationship “between” based on morphological operators <i>Isabelle Bloch, Olivier Colliot and Roberto M. Cesar</i>	299
 Part V Partial differential equations and evolutionary models	
Semidiscrete and Discrete Well-Posedness of Shock Filtering <i>Martin Welk and Joachim Weickert</i>	311
A Variational Formulation of PDE’s for Dilations and Levelings <i>Petros Maragos</i>	321
Stochastic Shape Optimisation <i>Costin Alin Caciu, Etienne Decencière and Dominique Jeulin</i>	333
On the local connectivity number of stationary random closed sets <i>Evgueni Spodarev and Volker Schmidt</i>	343
 Part VI Texture, colour and multivalued images	
Intersize correlation of grain occurrences in textures and its application to texture regeneration <i>Akira Asano, Yasushi Kobayashi and Chie Muraki</i>	357
Texture Segmentation Using Area Morphology Local Granulometries <i>Neil D. Fletcher and Adrian N. Evans</i>	367
Illumination-invariant Morphological Texture Classification <i>Allan Hanbury, Umasankar Kandaswamy and Donald A. Adjeroh</i>	377
Unified morphological color processing framework in a lum/sat/hue representation <i>Jesús Angulo</i>	387
Iterative area seeded region growing for multichannel image simplification <i>Dominik Brunner and Pierre Soille</i>	397
Morphology for Higher-Dimensional Tensor Data via Loewner Ordering <i>B. Burgeth, N. Papenberg, A. Bruhn, M. Welk, C. Feddern, and J. Weickert</i>	407

Part VII Applications in imaging sciences

Using Watershed and Multimodal Data for Vessel Segmentation: Application to the Superior Sagittal Sinus <i>N. Passat, C. Ronse, J. Baruthio, J.-P. Arméspach and J. Foucher</i>	419
Using grey scale hit-or-miss transform for segmenting the portal network of the liver <i>Benoît Naegel, Christian Ronse and Luc Soler</i>	429
Blood Cell Segmentation Using Minimum Area Watershed and Circle Radon Transformations <i>F. Boray Tek, Andrew G. Dempster and Izzet Kale</i>	441
Quantifying mean shape and variability of footprints using mean sets <i>J. Domingo, B. Nacher, E. de Ves, E. Alcantara, E. Diaz, G. Ayala and A. Page</i>	455
Exploiting and Evolving R^n Mathematical Morphology Feature Spaces <i>Vitorino Ramos and Pedro Pina</i>	465
Morphological Segmentation Applied To 3D Seismic Data <i>Timothée Faucon, Etienne Decencière and Cédric Magneron</i>	475
Index	485
Author Index	489